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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/588,728

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Martin Gordon Jesson

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EXAMINER

NGUYEN, DUC M

ART UNIT

PAPER NUMBER

2618

MAIL DATE

DELIVERY MODE

09/29/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/588,728	Applicant(s) JESSON ET AL.	
	Examiner DUC M. NGUYEN	Art Unit 2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 August 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/8/06</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Information Disclosure Statement

1. The references listed in the information disclosure statements submitted on 8/8/06 has been considered by the examiner (see attached PTO-1449).

Drawings

2. The drawings are objected to under 37 CFR 1.83(b) because they are incomplete. 37 CFR 1.83(b) reads as follows:

When the invention consists of an improvement on an old machine the drawing must when possible exhibit, in one or more views, the improved portion itself, disconnected from the old structure, and also in another view, so much only of the old structure as will suffice to show the connection of the invention therewith.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the

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examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The claims recited the limitation of “varying the index within the lookup table.... in dependence upon the sampled amplified RF signal”. However, since it is not clear how indexes of a look up table would be varied, a new drawing showing the varying of the index in a look up table is required for clarification purpose, noting that the patentability of the claimed invention is apparently relied on the above limitation according to the cited prior arts.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims **1-20** are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for “updating a lookup table comprising indexes”, does not reasonably provide enablement for “varying the index within the lookup table”. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims.

The limitation of “varying the index within the lookup table” is not clearly explained by the specification (see paragraphs [0021-0027]) that would enable any

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person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims.

However, in order to speed up prosecution of the application, the limitation of “varying the index within the lookup table....” would be interpreted as “update the look up table” or “obtaining the index within the lookup table” or “obtaining the distortion compensation data based on the index of the look up table” to correct predistortions of the transmitted signal. In another word, for subject matter purpose, the feedback signal (i.e, the sampled signal, either amplitude or phase or by comparison) are used to lookup distortions data that are indexed in a look up table according to the sampled signal to compensate for the distortions.

In addition, regardless of whether or not Applicant agrees with the above interpretation, Applicant is hereby requested to explain and/or amend the specification and/or claims to **clearly** describe the meanings of the limitation of “varying the index within the lookup table....in dependence upon the sampled amplified RF signal” in the next communication because of the possible patentability of the limitation.

Claim Rejections - 35 USC 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a

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whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims **1, 3-5, 7, 10, 19** are rejected under 35 U.S.C. 103(a) as being unpatentable by **Tiittanen** (US **5,371,481**) in view of **Lee** (US 6,246,865).

Regarding claims **1**, **Tiittanen** discloses a method of transmitting an amplified RF signal comprising:

providing a lookup table (LUT) for storing of predistortion data (see col. 2, line 52- col. 3, line 10 and col. 5, lines 18-22), wherein one skilled in the art would recognize that the data structure in EEPROM of **Tiittanen** would obviously comprise a table storing distortion data with indexes based on the output power in the similar way as disclosed by **Lee** (see col. 3, line 57 - col. 4, line 38);

providing a power amplifier circuit for receiving a first analog RF signal and for providing the amplified RF signal therefrom (see Fig. 1, regarding power amplifier 50);

receiving a digital modulated signal (see Fig. 1 regarding I/Q coder 12, and col. 5, lines 15-38);

indexing the LUT to provide indexed predistortion data (see Fig. 1, col. 2, lines 52-61, col. 5, lines 15-38);

predistorting the digital modulated signal in dependence upon the indexed predistortion data to form a predistorted digital modulated signal (see Fig. 1, col. 2, lines 52-61, col. 5, lines 15-38 and col. 6, lines 48-65);

converting the predistorted digital modulated signal into an analog modulated signal (see Fig. 1 regarding ADC 18, 20);

amplifying the analog modulated signal using the power amplifier to form the amplified RF signal (see Fig. 1, regarding amplifier 50);

sampling a portion of the amplified RF signal (see Fig. 1, regarding power meter 52); and,

varying the index (address) within the LUT for other than continuously changing the predistortion data that is used for predistorting of the digital modulated signal in dependence upon the sampled amplified RF signal (see col. 5, lines 35-66 and col. 2, lines 52-61 regarding updating amplitude/phase distortions in the EEPROM), wherein the output power meter 52 in **Tiittanen** would obviously be used as the **address** of the EEPROM in the similar way as clearly disclosed by **Lee** (see col. 4, lines 1-38), in order to obtain distortion values for amplitude/phase compensation.

Therefore, by simply modifying **Tiittanen** to provide a LUT as described by **Lee** to the EEPROM in **Tiittanen**, the claimed limitations regarding “varying the index within the LUT” are made obvious by **Tiittanen** and **Lee**.

Regarding claim **3**, **Tiittanen** would obviously teach the predistortion data is varied in dependence upon at least one of a **temperature** of the power amplifier and supply voltage and output load as claimed (see col. 3, lines 3-7 and col. 6, lines 3-15).

Regarding claim **4**, the claim is rejected for the same reason as set forth in claim 1 above. In addition, since the power meter in **Tiittanen** would have a limited dynamic

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range, it would have been obvious to one skilled in the art at the time the invention was made to modify Tiittanen to provide an amplitude detector with a predetermined dynamic range corresponding to higher amplitudes of the amplified RF signal in order to provide the sampled signal at higher carrier frequencies as suggested by Tiittanen (see col. 5, lines 39-47).

Regarding claim **5**, the claim is rejected for the same reason as set forth in claim 4 above. In addition, **Tiittanen** as modified in view of **Lee** would obviously teach detecting with the amplitude detector the magnitude of the amplified RF signal; determining an index within the LUT corresponding to a predistortion data for predistorting the digital modulated signal to correct the sampled amplified RF signal; and feeding the determined index back to the LUT in order to effect the predistortion of the digital modulated signal to correct the sampled amplified RF signal (see col. 5, lines 25-66).

Regarding claim **7**, the claim is rejected for the same reason as set forth in claim 4 above. In addition, **Tiittanen** as modified in view of **Lee** would obviously teach detecting with the amplitude detector the magnitude of the amplified RF signal; providing a predetermined relationship between a magnitude and phase response of the power amplifier circuit; determining a phase of the amplified RF signal in dependence upon the predetermined relationship; and, varying the index within the LUT in dependence upon the determined amplitude and phase of the amplified RF signal (see Tiittanen, col. 5, lines 25-66 and col. 6, lines 48-65, and Lee, col. 4, lines 1-63).

Regarding claim **10**, the claim is rejected for the same reason as set forth in claim 1 above. In addition, **Tiittanen** as modified in view of **Lee** would obviously teach determining an index within the LUT corresponding to a predistortion data for predistorting the digital modulated signal to correct the amplitude and phase of the sampled amplified RF signal; varying the index within the LUT in dependence upon the determined amplitude and phase of the sampled amplified RF signal (see Tiittanen, col. 5, lines 25-66 and col. 6, lines 48-65 and Lee, col. 4, lines 1-63).

Regarding claim **19**, the claim is rejected for the same reason as set forth in claim 3 above. In addition, **Tiittanen** as modified in view of **Lee** would obviously teach determining an index within the LUT corresponding to a predistortion data for predistorting the digital modulated signal to correct the amplitude and phase of the sampled amplified RF signal; varying the index within the LUT in dependence upon the determined amplitude and phase of the sampled amplified RF signal (see Tiittanen, col. 5, lines 25-66 and col. 6, lines 48-65 and Lee, col. 4, lines 1-63).

7. Claims **1-3, 6, 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable by **Kim** (US **2004/0017257**) in view of **Lee** (US **6,246,865**).

Regarding claim **1**, **Kim** discloses a method that compensates for pre-distortion of a power amplifier includes a digital pre-distorter controller which generates a power/phase compensation coefficient, a temperature compensation coefficient and a frequency compensation coefficient, a look-up table which stores the coefficients, a pre-distorter kernel which pre-compensates an input signal based on the temperature

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compensation coefficient from the look-up table, which would obviously include all the claimed limitations (see Fig. 6 and [0064-0079]).

However, Kim differs from the claimed limitation in that the index of the LUT in Kim is "indexed or "varied" in dependence upon the input signal (see [0070, 0075] noting for the "address") rather than on the sampled amplified RF signal. However, in an analogous art, **Lee** teaches a predistortion LUT wherein the index is "indexed" in dependence upon the sampled amplified RF signal (see col. 4, lines 1-38). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify **Kim** to index the LUT based on the sampled amplified RF signal, in place of the input signal, as suggested by **Lee**, as an alternative of obvious design choice. By doing so, Kim as modified in view of Lee would obviously teach all the claimed limitations of claim 1.

Regarding claim **2**, **Kim** as modified would further teach comparing the first predetermined symbol patterns to the second predetermined symbol patterns to vary the index of the LUT as claimed (see [0007, 0064, 0078]), noting that the baseband digital input signal (V_{ref}) would implicitly teach a first predetermined symbol patterns. The digital feedback signal (V_{fb}) would implicitly teach a second predetermined symbol patterns.

Regarding claim **3**, **Kim** as modified would further teach temperature dependence for distortion compensation as claimed (see [0076]).

Regarding claim **6**, the claim is rejected for the same reason as set forth in claim 2 above. In addition, the comparison to two predetermined symbol patterns would obviously comprise the step of minimizing differences between the first predetermined symbol patterns to the second predetermined symbol patterns as claimed, for minimizing distortion errors.

Regarding claim **11**, the claim is rejected for the same reason as set forth in claim 2 above. In addition, **Kim** as modified would further teach temperature dependence for distortion compensation as claimed (see [0076]).

Regarding claim **12**, the claim is rejected for the same reason as set forth in claim 3 above. In addition, the comparison to two predetermined symbol patterns as mentioned in claim 2 above would obviously comprise the step of minimizing differences between the first predetermined symbol patterns to the second predetermined symbol patterns as claimed, for minimizing distortion errors.

8. Claims **1-8, 10-16, 18-20** are rejected under 35 U.S.C. 103(a) as being unpatentable by **Chiesa et al** (US **5,524,296**) in view of **Lee** (US **6,246,865**).

Regarding claims **1, 8, Chiesa** discloses a method that compensates for pre-distortion of a power amplifier which would obviously comprise all the claimed limitations (see Figs. 1-2 and col. 2, line 28 – col. 5, line 27).

However, **Chiesa** differs from the claimed limitation in that the index of the LUT is "indexed or "varied" in dependence upon the input signal (see Fig. 2 and col. 4, lines

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28-38) rather than on the sampled amplified RF signal. However, in an analogous art, **Lee** teaches a predistortion LUT wherein the index is "indexed" in dependence upon the sampled amplified RF signal (see col. 4, lines 1-38). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify **Chiesa** to index the LUT based on the sampled amplified RF signal, in place of the input signal, as suggested by **Lee**, as an alternative of obvious design choice. By doing so, Chiesa in view of Lee would obviously teach all the limitations of claims 1 and 8.

Regarding claims **2, 6, Chiesa** as modified would further teach comparing the first predetermined symbol patterns to the second predetermined symbol patterns and minimizing differences between the first predetermined symbol patterns to the second predetermined symbol patterns to vary the index of the LUT as claimed (see col. 3, lines 33-42).

Regarding claim **3, Chiesa** as modified fails to teach a distortion compensation for temperature. However, it is noted that utilizing such distortion compensation for temperature variation is well known in the art. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify **Chiesa** to provide distortion data caused by temperature variation in a LUT as well, for further improving the performance of the transmitter.

Regarding claim **4**, the claim is rejected for the same reason as set forth in claim 1 above. In addition, since one skilled in the art would recognize that ADCs (Fig. 1) in **Chiesa** would detect signal amplitude and would have a limited dynamic range, it would have been obvious to one skilled in the art at the time the invention was made to modify

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Chiesa to provide the ADCs with a predetermined dynamic range corresponding to higher amplitudes of the amplified RF signal as claimed, in order to provide the sampled signal at carrier frequencies that are causing distortions.

Regarding claim **5**, the claim is rejected for the same reason as set forth in claim 4 above. In addition, **Chiesa** as modified in view of **Lee** would obviously teach detecting with the amplitude detector the magnitude of the amplified RF signal; determining an index within the LUT corresponding to a predistortion data for predistorting the digital modulated signal to correct the sampled amplified RF signal; and feeding the determined index back to the LUT in order to effect the predistortion of the digital modulated signal to correct the sampled amplified RF signal (see Figs. 1-2 and col. 3, lines 52-67).

Regarding claim **7**, the claim is rejected for the same reason as set forth in claim 1 above. In addition, **Chiesa** as modified would further teach determine relationship between amplitude and phase of the amplified signal as claimed (see Fig. 2 regarding CORDIC-2 and col. 3, lines 50-67).

Regarding claim **10**, the claim is rejected for the same reason as set forth in claim 1 above. In addition, **Chiesa** as modified would obviously teach predistortion correction based on amplitude and phase of the amplified signal as claimed (see Fig. 2 and col. 3, lines 50-67 regarding error tables).

Regarding claim **11**, the claim is rejected for the same reason as set forth in claim 3 above.

Regarding claim **12**, the claim is rejected for the same reason as set forth in claim 3 above. In addition, **Chiesa** as modified would further teach comparing the first predetermined symbol patterns to the second predetermined symbol patterns and minimizing differences between the first predetermined symbol patterns to the second predetermined symbol patterns to vary the index of the LUT as claimed (see col. 3, lines 33-42).

Regarding claim **13**, the claim is rejected for the same reason as set forth in claim 4 above. In addition, **Chiesa** as modified would further teach comparing the first predetermined symbol patterns to the second predetermined symbol patterns and minimizing differences between the first predetermined symbol patterns to the second predetermined symbol patterns to vary the index of the LUT as claimed (see col. 3, lines 33-42).

Regarding claim **14**, the claim is rejected for the same reason as set forth in claim 7 above.

Regarding claim **15**, the claim is rejected for the same reason as set forth in claim 14 above. In addition, **Chiesa** as modified would further teach determine relationship between amplitude and phase of the amplified signal as claimed (see Fig. 2 regarding CORDIC-2 and col. 3, lines 50-67).

Regarding claim **16**, the claim is rejected for the same reason as set forth in claim 3 above. In addition, **Chiesa** as modified would further teach providing a receiver circuit with a quadrature down-conversion mixer; quadrature sampling of the amplified

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RF signal with the receiver circuit; and detecting an amplitude and phase of the amplified RF signal (see Figs 1-2 and col. 3, lines 50-57).

Regarding claims **18-20**, the claims are rejected for the same reason as set forth in claim 10 above.

9. Claims **9, 17** are rejected under 35 U.S.C. 103(a) as being unpatentable by **Chiesa** in view of **Lee** and further in view of **Shi** (US **6,819,910**).

Regarding claim **9**, the claim is rejected for the same reason as set forth in claims 1, 8 above. However, **Chiesa** fails to teach the receiver circuit is a same receiver circuit used within a receiver path of a transceiver system. However, in an analogous art, **Shi** teaches a calibration method for a transmitter wherein the receiver circuit is reused in the feedback loop for calibration of the transmitter (see Fig. 11 and noting for the “reuse” in the title). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify **Chiesa** to reuse the receiver circuit in the feedback loop for predistortion compensation of the power amplifier as well, for cost saving.

Regarding claim **17**, the claim is rejected for the same reason as set forth in claim 9 above.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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See the attached PTO-892.

11. **Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(571) 273-8300 (for **formal** communications intended for entry)

(571)-273-7893 (for informal or **draft** communications).

Hand-delivered responses should be brought to Customer Service Window,
Randolph Building, 401 Dulany Street, Alexandria, VA 22314.

Any inquiry concerning this communication or communications from the examiner
should be directed to Duc M. Nguyen whose telephone number is (571) 272-7893,
Monday-Thursday (9:00 AM - 5:00 PM).

Or to Nay Maung (Supervisor) whose telephone number is (571) 272-7882.

/Duc M. Nguyen/

Primary Examiner, Art Unit 2618

Sept 25, 2008